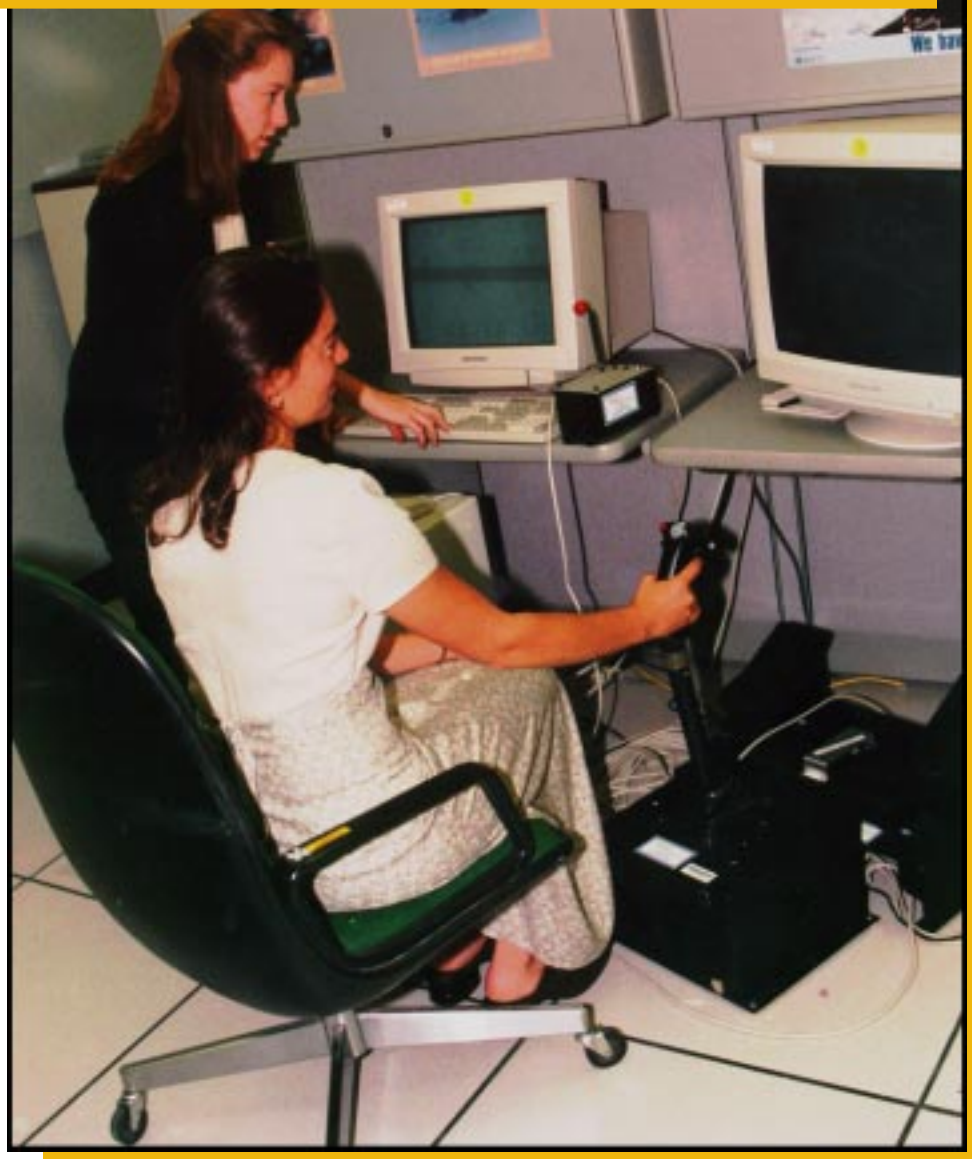
FLIGHT DYNAMICS BRANCH



The mission of the flight dynamics competency is to analyze and evaluate navy fixed-wing, helicopter, VSTOL, and unmanned air vehicle stability and control and flying qualities. This competency requires expertise in aerodynamics, stability and control, flying qualities, air vehicle design and aerodynamic database or math model development. The flight dynamics competency is involved in all phases of an air vehicle development and deployment: from preliminary design through engineering, manufacturing, and development and into production.

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The competency utilizes analysis, CFD predictions, wind tunnel test data, free flight and drop model data, piloted simulation, and flight test results to perform its support functions. The competency provides technical oversight on air vehicle development programs to pass on lessons learned from earlier development programs and the reality of fielding operational systems. The competency establishes wind tunnel testing requirements, participates in the collection of wind tunnel data, and oversees the development of the aerodynamic database that is used to predict the characteristics of the vehicle. Test plans are developed and executed for piloted simulation evaluations of the predicted aircraft to provide early feedback of the operational utility.

Flight Dynamics: Flight dynamics performs batch simulation studies of dynamic sensitivities to errors or uncertainties (aerodynamic or control power uncertainties, sensor noise, etc.), oversees flight testing by reviewing and approving test plans and granting flight clearances. After the aircraft is fielded, the flight dynamics competency participates in mishap investigations, technical assessments of engineering change proposals, and develop test requirements for clearing or expanding the flight limits for new configurations. Aircraft envelope limits are identified and documented by this competency and described in the aircraft NATOPS manual. Aircraft missions continuously evolve and, as a result, flying qualities criteria research is conducted to ensure design criteria accurately reflect the mission requirements for future platforms. Furthermore, we constantly strive to increase the mission performance or reduce the cost associated with aircraft operational use. By identifying the minimum requirements to satisfactorily perform a given mission, it is possible to expand the design space and allow the designer more latitude during design trade studies to optimize the configuration. This is accomplished through eliminating or reducing overburdening or unnecessary criteria that are loosely related to mission performance and imposing requirements/ guidelines more in line with the operational intent. This approach is consistent with the current drive of reducing or eliminating specifications.

To support the flight dynamics competency in its endeavors, a Flight Dynamics Computer Laboratory Facility has been developed. The laboratory, shared with the Store Separation Competency, provides an inexpensive resource to investigate flying qualities issues with current and future fleet aircraft. A moderate fidelity, easy access, batch and engineering pilot six degree of freedom simulation capability exists along with engineering workstations to provide the tools for dynamic analyses including both linear and non-linear simulation. Software algorithms allow the user to modify or design control laws to optimize the airplanes response.

For more information contact the Flight Dynamics Branches at the Naval Air Warfare Center Aircraft Division at Patuxent River, MD at 301-342-0282.